

Microbiological Quality of Some Selected Akamu Samples Sold in Some Areas of Kano Metropolis (A case study of Hotoro, Tarauni and Mariri)

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Abstract

The microbiological assessment of some akamu sample sold in some parts of Kano metropolis was determined. Two sample each from three selected location and homemade prepared sample (Control) was examined for microbial contamination using standard methods. The method included total aerobic, total fungi and coliform count. The result obtained showed that the samples were contaminated with various species of bacteria and fungi.

The mean total bacteria count and the fungal count varied from 1.30×10^5 CFu/ml- 1.82×10^5 CFu/ml and 1.30×10^5 CFu/ml - 1.74×10^5 CFu/ml respectively. Coliform bacteria were confirmed present in all the three sample collection points. However the control had the least coliform count. The PH of the sample ranged from 3.91-3.96. The hygienic condition of the akamu selling point should be concern to the community because many residents that patronize them, therefore adequate preventive measures must be taken.

Introduction.

Akamu is a Nigerian name given to a fermented and often sour starch cake processed exclusively from maize, corn, millet and sorghum. Akamu is usually smooth texture and is boiled into porridge called pap before consumption (Achi, 2005). Fermented akamu has a mild to strong sour flavor resembling that of yoghurt and characteristic aroma which quickly different it from starch and corn flour. The color of akamu depends on the cereal. Slightly cream for white maize, cream for yellow, light brown for sorghum and greenish to grey for millet (Marero *et al.*, 1989).

In Nigeria, the name depends on the locality and the cereal. The generic name is ogi in Western States of the country and in the Northern Nigeria, Akamu is the equivalent of maize ogi when it is consumed thick (Odunfa, 1985).

Ogi is a popular breakfast and infant weaning food in Nigeria (Bamigo and Miller, 2000; Odunfa, 1999). It is a starchy endosperm extract from fermented cereal grains (Akingbal *et al.*, 2001) various supplement of ogi has developed ranging from Tempe (Egunleti and Syarief, 1992) soya beans (Ademiji and Potter, 1998) and cowpea (Akobundu and Hoskin, 1999; Ojofeitimi *et al.*, 1984). Olukoya *et al.* (1994) reported the development of an ogi product (dogik), which have therapeutic properties on the basis of its ability to control diarrhea among infants. Dehydration of ogi by drum or tray drying was however reported to destroy heat sensitive nutrients, also, an appreciable loss in the available lysine content as a result of drum drying (Adeniji and Potter, 2000).

Fermented maize (Ogi) is staple cereal of the yoruba's in Nigeria and is the first food given to babies at weaning (Akinrele, 1999). It is produced by soaking corn in water for 1-3 days, followed by milling and sieving through screen mash. The sieve material is allowed to sediment and ferment and is marked as wet cake (Akinrele, 1999). The quality of akamu sold in Kano

metropolis is not at the desired level of quality and nutritional value which may be as a result of contamination by pathogens, storage and handling of required standard. The study is there designed to examined the possibility of pathogens in akamu sold in Kano.

Materials and Methods

Collection of Samples

The pap samples were purchased from hawkers at Tarauni, Mariri and Hotoro form two different locations each labeled as TL1, TL2, ML1, ML2, HL1, HL2 and HOME MADE stored at refrigerated temperature analyzed within one hour after collection. A total of seven (7) pap samples consisting six pap smaples bought from hawkers from each of the locations and one homemade produced and analyzed.

Microbiological Analysis

Treatment procedure 1 of each sample was passed in a test tube containing 9ml steril distilled water using a sterile syringe and shaken vigorously serial dilution of each were made from 10^{-1} dilution to 10^{-5} dilution under aseptic conditions. 1ml of the 10^{-3} - 10^{-5} dilution was used to inoculate different agar plates, molten nutrient agar was used for enumeration of the total bacteria count while PDA was used for enumeration of fungi count using pour plate methods. The paltes were incubated at 37°C for 24-48 hours. Colony formed were counted using Gallen Kamp colony counter. Coliform were also detected using presumptive confirmatory test as described by Fawole and Oso (2004). Colonies were counted and representative colonies taken for identification.

Result

Mean Temperature and P^H Values and Total Bacteria Counts (Cfu/ml) and Fungal Counts for Freshly prepared Akamu.

| SAMPLES | Temperature | P ^H | Bacteria count | Fungal counts | Total coliform |
|-----------|-------------|----------------|---------------------------------------|---------------------------------------|----------------|
| TL1 | 31.7 | 3.96 | $1.60 \times 10^5 + 2.12 \times 10^2$ | $1.31 \times 10^5 + 1.2 \times 10^2$ | 21 |
| TL2 | 31.9 | 3.96 | $1.61 \times 10^5 + 1.01 \times 10^2$ | $1.40 \times 10^5 + 9 \times 10^2$ | 20 |
| ML1 | 30.8 | 3.95 | $1.59 \times 10^5 + 1.10 \times 10^2$ | $1.74 \times 10^5 + 1.31 \times 10^2$ | 11 |
| ML2 | 30.9 | 3.95 | $1.54 \times 10^5 + 1.34 \times 10^2$ | $1.73 \times 10^5 + 1.24 \times 10^2$ | 90 |
| HL1 | 3.91 | 3.91 | $1.82 \times 10^5 + 1.20 \times 10^2$ | $1.39 \times 10^5 + 1.10 \times 10^2$ | 28 |
| HL2 | 3.90 | 3.91 | $1.60 \times 10^5 + 9.1 \times 10^2$ | $1.65 \times 10^5 + 3.1 \times 10^2$ | 20 |
| HOME MADE | 3.87 | 3.89 | $1.30 \times 10^5 + 13.4 \times 10^2$ | $1.74 \times 10^5 + 13.4 \times 10^2$ | 7 |

TL1=Tarauni Location 1, TL2=Tarauni Location2, ML1=Mariri Location 3, ML2=Mariri location 2, HL1=Hotoro Location 1, HL2=Hotoro Location 2, Cfu/ml= Colony forming unit.

Discussion

All samples were acidic in nature (P^H 3.89-3.96). This level of acidity have been described by some researchers Efiuvwerwere and Akoma (1995) and Akoma *et al.*, (2006) who attributed the acidity to the presence of Lactic acid bacteria during the fermentation process. In this study however, attention was directed at isolating pathogenic bacteria. Similar local drinks with acidic P^H values have been reported for zobo and orange products (Lateef *et al.*, 2007) as well as burukutu and pito (Kolawole *et al.*, 2007). Although these classes of beverage were acidic in nature, the acidity tends to increase with increase in fermentation period resulting in the spoilage. Consequently, the low ph values may have encourage the growth of fungi and could be responsible for the species of microorganism isolated.

The main components of cereals from which Akamu is made are carbohydrates, proteins, vitamins and minerals and the product of fermentation is lactic acid and this lead to decrease in ph values and increase in acidity (Nkama, 1993)

Akamu and other indigenous Nigerian non-alcoholic beverages such as kunu aya have been reported to contain high nutritional value because of the raw material from which they are made. Species are usually added in small quantities to improve test and flavor and these are agricultural commodities which may contain high level of microbial impurities (Adeyemi and Umar, 1994). These can be sources of spoilage and pathogenic microorganisms (Bibek, 2001). The ph of akamu sample is too low to enhance the growth of microorganisms. The total bacterial count in the various sample ranged from from 1.30×10^5 - 1.82×10^5 Cfu/ml and 1.31×10^5 - 1.74×10^5 Cfu/ml for fungal count. The microbial count obtained in this study was within the recommended safe limit if microbial guidelines for ready to eat foods adopted by the international commission of microbiological specification of food (ICMSF, 2002) which states that the microbial safe limit for ready to eat food should fall between the range of 10^2 - 10^5 Cfu/ml.

The total coliform count in all various pap samples ranged from 7-93 coliform which is within the maximum of < 100cfu/ml recommended by the food and agricultural organization (FAO, 2003) for coliform count in non-bottled drinks, although all the samples fall within the safe limit for consumption the high colony count is still concern this could have been as a result of either poor hygiene or poor quality of the cereals and water used. Homemade sample however, had the least bacteria count of $.30 \times 10^5$ Cfu/ml and coliform count which was 7 Cfu/ml. this could be due the sterile water that was used during production. The high presence of coliform bacteria in hawked papa sample is expected due to high rate of tap water contamination in Kano metropolis.

Coliform has been reportedly associated with tap water popularly consumed in some towns in Nigeria (Adegoke *et al.*, 1993). Amusa and Ashaye (2009) also reported that the presence of coliforms in hawked pap samples in South-West Nigeria was as a result of contaminated water, containers as well as dirty environment where the pap samples were being processed or even hawked.

Conclusion and Recommendation

The study revealed that a high degree of contamination by microorganisms was observed in all the samples analysed despite being within the microbiological acceptable limits for consumption their presence poses a considerable risk to public health

In light of the above it is therefore recommended that strict adherence to principles of food hygiene, maintenance of good and standard temperature/ sanitary conditions during preparations and storage of these food as well as re-heating of the food prior to consumption is a necessary measure to ensure food safety. Marketing of ready to eat foods in temperature controlled vessels rather than open trays proper packaging and enlightenment of food handlers/hawkers on food and personal hygiene is strongly recommended.

Treated municipal water or clean water should be used during processing and dilution of the processed drink to avoid contamination with enter-pathogenic bacteria.

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